

REMARKS

Claims 1, 2, 4-18, and 20 remain pending in this application. Claim 1-19 are rejected. Claims 1 and 12 are amended herein. Claim 20 is now added and includes subject matter relating to the 4% or less residue level and the strength of the compressed core substrate exposed section being substantially equal to the pressed portions. Claim 19 is cancelled.

The following remarks supercede and elaborate upon those presented in the Amendment after Final Rejection filed on June 9, 2006, which was filed with a Request for Continued Examination.

CLAIM REJECTIONS UNDER 35 U.S.C. §§ 102(b) and 103(a)

Claims 1, 2 and 4-18 are rejected under 35 U.S.C. § 102(b) as being anticipated by either the Hideo or Mikiaki references or in the alternative under 35 U.S.C. § 103(a) as being rendered obvious by either the Hideo or Mikiaki references. Claims 3 and 19 are rejected under 35 U.S.C. § 103(a) as being rendered obvious by either the Hideo or Mikiaki references. Applicant herein respectfully traverses these rejections.

The Office Action states that determination of the patentability of a product-by-process claim turns on the whether the product produced is distinguishable over the prior art product. Applicants do not dispute this premise. However, applicants submit that the process outlined in the present product claims produces a product which is distinguishable by structural characteristics over the products produced by either one of the prior art references.

Each of the independent claims, claims 1 and 12, recite the process steps of the method claims of the parent application which have now issued in U.S.

Patent number 6,878,173. To the extent these patented process limitations produce structural distinctions in the *product* over the prior art, the distinctions must be given as much consideration as traditional product characteristics. See *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972).

In setting forth both the anticipation and obviousness rejections the Examiner has made presumptions regarding the products produced by the applied references. The presumptions include that the residue level of the claims is taught and enabled by the art and that the claimed boundary straightness and strength characteristics are enabled by the art. Applicant respectfully submits that for the reasons submitted below these rejections do not set forth *prima facie* grounds for rejection.

Claim 12 stands rejected as anticipated by either the Hideo or the Mikiaki reference. Claim 12 includes features which is not found in the applied references singularly or in a combination of the references. In particular, the features relating to the 4% or less residue level, the straight boundaries with a deviation of no more than 0.2 mm, and the strength of exposed substrate being substantially equal to the pressed portion are not taught as a combination or individually and are not enabled by the references.

Claim 12 as amended sets forth the following:

removing the active material from a volume of said active material impregnated core substrate defined by said rail shaped protrusion and extending from said first surface at said rail shaped protrusion to an opposing second surface of of said active material impregnated core substrate to form said rail shaped protrusion into a core substrate exposed section by applying ultrasonic vibrations to said rail shaped protrusion so as to result in 4% or less residual active material by weight in said volume of said core substrate exposed section;

The above amendment clarifies that the active material is removed from the volume of the porous strip. It is respectfully submitted that neither the Mikiaki nor the Hideo reference teaches nor enables such a structural characteristic wherein residue of active material in the volume of the current collector is 4% or less.

It is accepted that "anticipation of invention set forth in product claims cannot be predicated on mere conjecture respecting the characteristics of products that might result from practice of processes disclosed in the references." *W.L. Gore Assoc., Inc. v. Garlock, Inc.*, 220 USPQ 303, 314 (Fed. Cir. 1983). Additionally, anticipation requires that the prior art reference must be enabling, i.e., it must contain within its four corners a sufficient description to enable one to practice the invention of the rejected claim without undue experimentation or inventive skills. *Akzo N.V. v. U.S. Intern. Trade Com'n*, 1 USPQ2d 1241, 1245 (Fed. Cir 1986).

Claim 12 now recites that the volume of the core substrate exposed section is processed to have 4% or less residual active material. The Examiner contends that the Hideo reference teaches that *no* active material is left. Applicants submit that the statement in Hideo is not a statement that one skilled in the art would take in its literal sense and was most likely intended to reference merely to a surface of the exposed portion in view of test results provided herewith.

As discussed in the last response, the Hideo reference teaches that the active material is removed by brushing. On page 3, line 19 to page 4, line 1 of the present specification, the method of removal of the active material using a brush and air blower is described as imperfect, resulting in an increased likelihood of unsatisfactory welding occurring during attachment of the current collector formed from the projected part 4, due to residue of the active material left in the projected part by the brush operation. This discussion in the specification is based upon experience using the brushing method and reflects the insight of those skilled in the

art who have worked with the brushing technique referenced in the Hideo reference. Both brushing and blowing act upon the surface of the material. It is submitted that the term "no material" was intended to be understood as being a desired goal.

It is respectfully submitted that the premise that the Hideo reference teaches one skilled in that the collector strip actually has no residue is not sustainable in view of above stated physical properties of the brushing and blowing method. Applicants submit that the Hideo reference may have intended to mean that no residue is on the surface of the collector strip.

In support of applicants' position, the applicants now submit evidence of the innocent overstatement of the Hideo. The Examiner's attention is directed to the Rule 132 Declaration provided herewith wherein test data is presented showing that, contrary to the Examiner's belief stated in the Office Action, the method disclosed in the Hideo reference does not remove *all* the active material from the substrate material corresponding to the claimed exposed substrate section. Details of the procedures employed are set forth in the Declaration and conform to the claimed invention and the Hideo disclosure. The test data shows that residues left in the test samples of the Hideo process were not 4% or less as is required by claim 12, and instead ranged from 4.37 % to 5.53%, with a mean value of 4.83%.

In marked contrast, the present invention, using ultrasonic vibration on like substrate material in a non-compressed impregnated state as set forth in the claims, produced residue levels of 2.57% to 3.7% with a mean value of 3.27%. Therefore, not only did the Hideo process fail to remove *all* the residue, on average the Hideo process left 48% more residue than the process recited in the present claims. Therefore, it is respectfully submitted that Hideo is not enabling with respect to the invention of claim 12 and cannot anticipate the claim.

The Examiner further cites the Mikiaki reference as anticipating claim 12. However, the Mikiaki reference does not disclose that 4% or less residue is left in the volume of the collector and applicants have also not stated this. The Mikiaki reference teaches an ultrasonic method applied to an electrode which is impregnated *and compressed*. The Mikiaki reference is discussed extensively in the specification wherein it is noted that it is difficult to remove the active material from a compressed electrode. See specification pages 2-5 and Figs. 7A to 7E. Due to this difficulty active material is left in the collector. Specification page 3, line 19 to page 4, line 1.

The Examiner remarks in the Response to Arguments section of the last Office Action that applicants have admitted that the Mikiaki method uses ultrasonic vibrations and results in 4% or less active material. This is not the case. Applicants merely acknowledge that the Mikiaki reference discloses using ultrasonic vibrations. However, these vibrations are used on compressed material from which removal of the active material is hindered. Applicants did not state that the Mikiaki reference leaves 4% or less residue. Such a statement would be contrary to the above noted discussion in the specification.

Claim 12 additionally recites that the collector, i.e., said core substrate exposed section, has a strength substantially equal to the pressed portions having the active material. The Examiner states in the Response to Arguments section that weakening of the substrate "is not taught in the prior art reference." This is completely immaterial. It is not to be expected that a patent reference will catalog its deficiencies and the absence of statement of such deficiencies does not establish a *prima facie* case of either anticipation or obviousness based upon the premise that such deficiencies do not exist. This is precisely why anticipation "cannot be predicated on mere conjecture respecting the characteristics of products that might

result from practice of processes disclosed in the references.” *W.L. Gore Assoc., Inc. v. Garlock, Inc.*, 220 USPQ 303, 314 (Fed. Cir. 1983).

As is apparent from the present Office Action, confusion has stemmed from applicant’s statement relating that the ultrasonic vibration in the presently claimed invention does not weaken the rails in the response of September 29, 2005. The full statement presented reads:

The weakening cause by removing the active material from the compressed inverted rail area is avoided by the process presented in the now pending claims by using *ultrasonic vibration* to remove the active material from the rail shaped protrusion *prior to compression*.

Pages 12-13 (Emphasis Added). Applicant did not state that the process of the Mikiaki teaching does not weaken the rails. Furthermore, in view of the marked difference of the processes of the present invention and the Mikiaki reference, it is respectfully submitted that one skilled in the art would not expect similar results. It thus follows that conjecture regarding resultant strength would not be reasonable where it should be clear that application of more energy would be required to remove active material from a compressed material than from a non-compressed material.

The Response to Arguments also avers that applicants have not provided evidence to support arguments that weakening occurs in the prior art. This assertion overlooks the lengthy explanation of the occurrence of the weakening phenomena offered in the present specification. The present specification, after specifically identifying the Mikiaki and relating the deficiencies of the Mikiaki reference in the Background section, page 5, follows on in the Detailed Description to contrast the present invention to the prior art Mikiaki process, stating:

In the active material removal step of the embodiment,

although the application of ultrasonic vibrations is used for removing the active material 3, there is no deterioration in the strength of the core substrate 1. This effect was confirmed by evaluation results from a tensile tester. In contrast, in cases in which the application of ultrasonic vibrations is used for removing the active material 3 impregnated in a conventional core substrate 1, the strength of the core substrate 1 typically falls by 50 to 70%. The reason for this observation is that in the conventional manufacturing methods, a core substrate 1 impregnated with an active material 3 is subjected to press working prior to the application of ultrasonic vibrations to the regions to become current collectors, and consequently the active material 3 is in a state which is extremely difficult to remove. In contrast, in this embodiment, the active material 3 impregnated in the protrusions 8, 8, which have undergone almost no press working, is removed, and moreover the ultrasonic vibrations are applied only to the top of the protruding protrusions 8, 8 and have little effect on the other regions, and consequently the core substrate 1 suffers no deterioration in strength.

Specification, page 20. Thus, it is respectfully submitted that applicants have establish the process of the Mikiaki reference weakens the rails in comparison to the electrode material, i.e., pressed portions, which is not exposed to the ultrasonic vibrations.

Claim 1 recites the former subject matter of claim 3, that the electrode plate of the battery is produced to have straight boudaries between the core substrate exposed section and the pressed portions. The claims recite "substantially true straight boundaries" and that these boundaries "exhibit a deviation from straight of no more than 0.2 mm." This feature is also incorporated into claim 12 from claim 19.

The Examiner's contention is that it would be obvious for a one of ordinary skill in the art to provide a boundary with the claimed straightness "in order to apply a straight lead onto the exposed section of the substrate, as taught in both

references, without overlapping active material” because “[i]f the active material boundary is not straight, the lead will overlap the active material and not be securely bonded to the substrate plate.” With regard to the Examiner’s reasoning, it is not evident where in the prior the Examiner finds a basis for the suggestion of the *claimed straight boundary*.

The claimed boundary is *between* the core substrate *exposed sections* and the *pressed portions which contain the active material* and function as electrodes undergoing electrolytic reactions to produce current. The exposed sections function as conductors to collect current. The Examiner refers to the Mikiaki reference teaching applying “a straight lead onto the exposed section of the substrate.” However, it is the outer *edges* of the exposed sections in the Mikiaki reference that are connected to flat “straight” collector leads 6 as shown in Fig. 4 of Mikiaki reference, not edges associated with the *claimed boundary*.

In contrast to the portion of the Mikiaki reference referred to by the Examiner, it is the boundary between the active material impregnated portions, i.e., the pressed portions, and the exposed sections that is referred to in claims 1 and 12. This claimed boundary is at a remote side of the exposed section from the *edges* which are connected to the collector lead plate 6 and to which the Examiner refers in the rejection. Hence, it is respectfully submitted that the rejection does not relate to the claimed boundary but instead relates to a different boundary.

The Mikiaki reference is concerned with curvature of the *edges* interfering with the connection to the edge. Thus, it is not at all clear why the issue of boundary straightness is highlighted by the references since neither indicates a problem described by the Examiner exists. Indeed, even if the boundary wavers, the lead will still be bound to the edge of the exposed portion which by definition is exposed to allow bonding. In other words, since the lead of the Mikiaki reference is not attached to the straight boundary of the claims, the portion referred

to by the Examiner sets forth no need for straightness of the claimed boundary. Hence it is submitted that the references do not provide suggestion to arrive at the substantially straight boundary edge as claimed.

It is further respectfully submitted that it is *irrelevant* whether the Hideo or Mikiaki references suggest such a boundary straightness, because they do not *enable* the claimed boundary straightness. It is the process of the present invention which produces the claimed boundary straightness. This process has been found to be novel and nonobvious as demonstrated by the issuance of the method claims in the parent application. Even if one desired to produce a straight boundary as claimed, it is settled case law that mere desirability of a characteristic of a product cannot render a product obvious when the prior art does not teach nor render obvious a process to enable production of a product with the characteristic. *In re Irani*, 166 USPQ24, 27 (CCPA 1970).

The present situation is similar to the situation in *In re Irani*, id, wherein product by process claims were directed to making glass sheets having improved flatness. It was known that flat glass sheets were desirable so the Examiner reasoned that it would be obvious to pursue formation of glass sheets having a high level of flatness as claimed.

In the present situation, applicants do not concede that the reference suggest the desirability of the claimed boundary straightness, but whether such suggestion exists is irrelevant in view of the holding of *In re Irani*. According to the reasoning presented in *In re Irani*, even if the art suggested that the boundary straightness was desirable, this suggestion is insufficient to show obviousness of a product having such straightness, or flatness in the case of the glass sheets of *In re Irani*. This is because the prior art *did not enable* achieving such a characteristic. Hence, the product produced by the issued novel and nonobvious patent method claims is nonobvious because it was *not enabled* by the prior art and

thus could not be obvious to produce. This is precisely analogous to the present situation with the exception that, in the present case, it is further submitted that even the desirability of the straightness of the claimed boundary is not established.

The failure of the Mikiaki process to establish a straight boundary is also made evident by the data presented in the Rule 132 Declaration presented herewith. The straightness of the Mikiaki reference varied by about 0.6 mm while the presently claimed invention yielded boundaries that varied by no more than 0.15. see Table II, rule 132 Declaration. The Examiner is invited to observe the boundaries provided by the present invention in Declaration Figs. 2 and 3 in contrast to the boundary provided by the Mikiaki process shown in Fig. 1. Therefore, it is submitted that it is evident the process of the Mikiaki reference does not produce the claimed boundary straightness.

In view of the above , it is respectfully submitted that the rejected claim 1 is not anticipated nor rendered obvious in view of the cited references for the reasons stated above relating to the boundary straightness not being taught nor enabled by the applied references. It is further submitted that claim 12 is not anticipated because no reference teaches the combination of the features relating to the 4% or less residue level, the straight boundaries with a deviation of no more than 0.2 mm, and the strength of exposed substrate being substantially equal to the pressed portion.

It is further respectfully submitted that the references of the prior art do not teach nor make obvious a method enabling production of the claimed combination of product characteristics of claim 12, i.e., a collector having 4% or less residue of active material boundary straightness, and strength. Only the method of the present invention allows production of a product having the characteristics set forth in claim 12. Therefore, reconsideration of all rejections and allowance of all claims is earnestly solicited.

Respectfully submitted,
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